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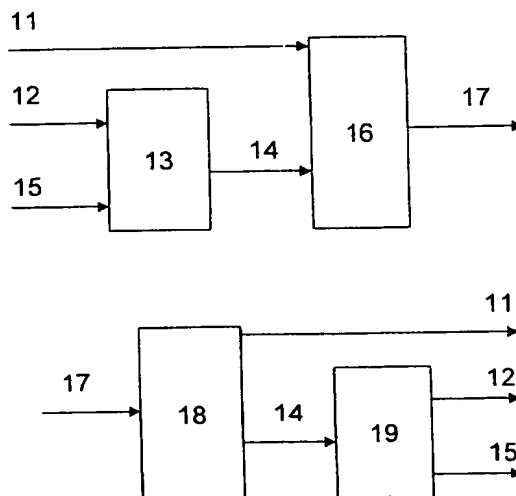
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: TRANSMISSION, RECORDING AND REPRODUCTION OF VIDEO SIGNALS AND ADDITIONAL SIGNALS



(57) Abstract: The experience when viewing films at home is enhanced by a physical perception being enabled in addition to the reception of picture and sound. For this purpose, video signals and additional signals which can be used during the reproduction of the video signals in order to act physically on the human body or to enable a feel for contents of the video signals displayed are transmitted and/or recorded jointly as a television signal. In the case of an analogue television signal, the additional signals are inserted into the vertical blanking interval of the television signal, advantageously as teletext signals. If the television signal is transmitted or recorded digitally, in particular in accordance with an MPEG standard, then the additional signals are inserted into what are called the user_data of the extensions_and_user_data of the picture layer.

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TRANSMISSION, RECORDING AND REPRODUCTION OF VIDEO SIGNALS AND ADDITIONAL SIGNALS

5 The invention relates to a method and apparatus for the transmission, recording and reproduction of video signals, and to an information carrier for video signals, additional signals being able to be used during the reproduction of the video signals in order to enable an
10 application of forces to the human body or a feel for contents of the video signals displayed.

Prior Art

15 For the reproduction of films in cinemas, various further developments are known which go beyond the simple reproduction of picture and sound signals. Several of these refinements, such as wide-screen display or surround-sound reproduction, are currently making an
20 appearance to an increasing extent in television receivers. By contrast, other refinements have hitherto been restricted to cinemas, in particular leisure parks. Thus, by way of example, 3D film reproduction with a satisfactory result is currently possible only in cinemas
25 using special projectors and with suitable spectacles being handed out to the viewers.

From the cinemas of various leisure parks it is also known for the experience when viewing films to be further
30 enhanced by a physical perception being enabled in addition to the perception of picture and sound. For this purpose, the audience, while viewing the film, are in simulators which execute movements in a manner matching the reproduced film. Thus, e.g. during the film
35 reproduction of an aeroplane flight, the simulator can be tilted forwards for a nosedive and backwards for an ascent, in order in this way also to impart a physical impression of the flight to the film audience.

Invention

The invention is based on the object of specifying a
5 method for the transmission or recording of video signals
which enhances the experience when viewing films at home.
This object is achieved by means of the method specified
in Claim 1. Furthermore, the invention is based on the
object of specifying a corresponding method for the
10 reproduction of the video signals and an apparatus for
carrying out the aforementioned methods according to the
invention. This object is achieved by means of the method
specified in Claim 5 and the apparatus specified in Claim
9. Finally, the invention is based on the object of
15 specifying an information carrier for such video signals.
This object is achieved by means of the information
carrier specified in Claim 10.

The invention is based on the insight that in the
20 domestic sector, too, the experience of viewing a film
can be enhanced by a physical perception being enabled in
addition to a perception of picture and sound.

In principle, the invention's method for the transmission
25 or recording of video signals therefore consists in the
video signals and additional signals which can be used
during the reproduction of the video signals in order to
act physically on the human body or to enable a feel for
contents of the video signals displayed being transmitted
30 and/or recorded jointly as a television signal.

In the case of transmission as an analogue television
signal, the additional signals are in this case
preferably inserted into the vertical blanking interval
35 of the television signal. This ensures
backwards-compatible transmission since, on the one hand,
the additional signals can be separated from the video
signal and processed further in a straightforward manner

at the receiving end but, on the other hand, the video signal itself is not interfered with and, therefore, the video signals can also be reproduced without interference on conventional receivers.

5

In the case of an analogue television signal, it is particularly advantageous for the additional signals to be transmitted as teletext signals. This makes it possible for the separation of the additional signals from the video signals to be carried out by the teletext decoder which is present in any case in the television set.

15

If the television signal is transmitted or recorded digitally, in particular in accordance with an MPEG video stand, then it is advantageous to insert the additional signals into the so-called user_data of the extensions_and_user_data of the picture layer. In this case, the additional signals are suitably identified, so that reproduction can be effected by correspondingly equipped receiving or reproduction devices and, on the other hand, the additional signals are not taken into consideration in a conventional receiving or reproduction device, backwards compatibility thereby being ensured.

25

In principle, the invention's method for the reproduction of video signals consists in a television signal being examined for an identifier for additional signals which are used in order to act physically on the human body or to enable a feel for contents of the video signals displayed, and, if the identifier is present, the additional signals being separated from the television signal and being output together with the video signals.

30

Advantageous refinements of the reproduction method emerge here in a manner corresponding to the abovementioned developments of the transmission and/or recording methods.

35

Likewise, corresponding apparatuses for carrying out the methods emerge indirectly from the configurations of the methods according to the invention. The same applies to
5 the information carrier according to the invention, which is particularly advantageously configured as an optical storage medium, in particular as a DVD.

Drawings

10

Exemplary embodiments of the invention are described with reference to the drawings, in which:

- Figure 1 shows a system according to the invention for
15 an analogue television signal; and
- Figure 2 shows a system according to the invention for a digital television signal.

20

Exemplary embodiments

In the case of analogue television systems such as PAL, NTSC or SECAM, no video signals are transmitted in the "vertical blanking interval", also VBI for short.
25 Instead, this area is utilized for digital data. Thus, what are called the VPS data are transmitted in the VBI in order to simplify control of the recording operation of a video recorder. Likewise, what are called WSS bits are communicated, which contain an item of information
30 about the format of the video signal displayed. Furthermore, what is called teletext is utilized in order to reproduce, in addition to the television programmes offered, current news, weather reports, sports information, etc., by means of characters and graphics on
35 the screen. For teletext transmission, lines 11 to 15, 20, 21 in the first field and lines 323 to 328, 333 and 334 in the second field are used, in particular, in Germany.

According to the invention, however, the teletext signal can also be utilized in order to enable, instead of a transmission of message information, a transmission of
5 additional signals for physical feedback, also called force feedback signals hereinafter.

In this case, the additional signal 12 is firstly fed together with teletext signals 15 that may be present to a
10 unit 13, in which both signals are converted into the teletext format and combined. Thus, it is conceivable, for example, to use specific lines in the VBI for the additional signals and to reserve lines that are different therefrom for teletext signals. The combined
15 signal 14 is then fed together with the actual video signal 11 to a multiplexer unit 16. This multiplexer 16 then inserts the additional signals and teletext signals into the VBI of the video signal 11. This combined signal 17 is then transmitted and, at the receiving end, fed to
20 a corresponding demultiplexer 18. The latter then separates the signal 14, which comprises the additional signals and teletext signals, from the video signal 11. Finally, the teletext and the additional signals are then separated from one another in a recovery unit 19 so that
25 they can then be fed to suitable reproduction units.

For the transmission or recording of digital television signals, it is known to use the MPEG II video standard as specified in ISO/IEC13818-2. In this case, the data are
30 encoded hierarchically in six layers, which are designated as sequence layer, GOP (Group of Picture) layer, picture layer, slice layer, macroblock layer and block layer. These different layers allow access and separate treatment of different basic elements of the
35 data stream generated. Furthermore, the specification provides data areas, called user_data hereinafter, which can be utilized by the user for specific applications.

The use of such user_data for the transmission of force feedback signals in digital television is illustrated in Figure 2. Force feedback signals 21 are fed to a force feedback encoder 23, which inserts the force feedback signals into the user_data. The encoded force feedback signals 26 are then fed to a multiplexer 28. The video signal 22 is fed to a video MPEG encoder 24, which, for the encoding, is connected to a buffer memory 25. The MPEG-coded stream is then likewise fed to the multiplexer 28. In the multiplexer 28, the force feedback signals are then inserted into the user_data of the picture layer of the MPEG video bit stream. The encoding of the audio signal, which is likewise fed to the multiplexer 28, is not illustrated. The combined signal is then transmitted or recorded in this way on an information carrier such as a DVD. During reproduction, the inversed steps are then effected. Firstly, the signal is fed to a demultiplexer 29. The latter firstly separates the force feedback signal in the user_data of the picture layer from the video bit stream. The force feedback signals 26 are then fed to a decoder 210, which regenerates the original force feedback signals 21 from the signals transmitted in the user_data. Likewise, the video signal 27 is fed to an MPEG decoder 211, which in turn decodes the video signals using a buffer memory 212. The video and audio and force feedback signals are then fed to corresponding reproduction apparatuses.

For the reproduction of the force feedback signals, it is possible to make use of any desired apparatuses for exerting forces on the human body: Thus, it is possible to provide suitable chairs which can be tilted in different directions by electric motors. Likewise, it is possible to provide "data gloves", which make it possible to feel film objects displayed. Finally, any desired body sensors can be stimulated in a controlled manner, not just those which detect force. Thus, it is also possible to make an impression on the sense of temperature, taste

or balance. This can also be done without direct contact with the respective sense organ, e.g. by using electric or magnetic fields.

- 5 The invention can be used in a wide variety of devices appertaining to consumer electronics, such as e.g. of TV sets, set-top boxes, video recorders, DVD players, satellite receivers, TV-video combinations.

Patent Claims

1. Method for the transmission or recording of video signals, additional signals being used during the reproduction of the video signals in order to act physically on the human body or to enable a feel for contents of the video signals displayed, characterized in that video signals and additional signals are jointly transmitted or recorded as a television signal.
2. Method according to Claim 1, characterized in that the video signals and additional signals are transmitted or recorded as an analogue television signal, the additional signals being inserted into the vertical blanking interval of the television signal.
3. Method according to Claim 2, characterized in that, prior to transmission or recording, the additional signals are converted into a teletext format and inserted as a teletext signal into the vertical blanking interval.
4. Method according to Claim 1, characterized in that the video signals and additional signals are transmitted or recorded as a digital television signal in accordance with an MPG Video Standard, the additional signals being inserted into the user_data of the extensions_and_user_data of the picture layer.
5. Method for the reproduction of video signals, additional signals being used in order to act physically on the human body or enable a feel for contents of the video signals displayed characterized in that a television signal is examined for an identifier for such additional

signals and, if the identifier is present, the additional signals are separated from the television signal and output together with the video signals.

- 5 6. Method according to Claim 5, characterized in that the television signal is present as an analogue television signal, the additional signals being separated from the vertical blanking interval of the television signal.
- 10 7. Method according to Claim 6, characterized in that the additional signals are present as a teletext signal.
- 15 8. Method according to Claim 5, characterized in that the television signal is present as a digital television signal in accordance with an MPEG video standard, the additional signals being separated from the user_data of the extensions_and_user_data
20 of the picture layer.
9. Apparatus for carrying out the method according to one of the preceding claims.
- 25 10. Information carrier for video signals, additional signals being able to be used during the reproduction of the video signals in order to act physically on the human body or to enable a feel for contents of the video signals displayed,
30 characterized in that the video signals and additional signals are jointly recorded as a television signal, the additional signals being identified as such.
- 35 11. Information carrier according to Claim 10, characterized in that the additional signals are inserted into the user_data of the extensions_and_user_data of the picture layer.

12. Information carrier according to Claim 10 or 11, characterized in that an optical storage medium, in particular a DVD, is involved.

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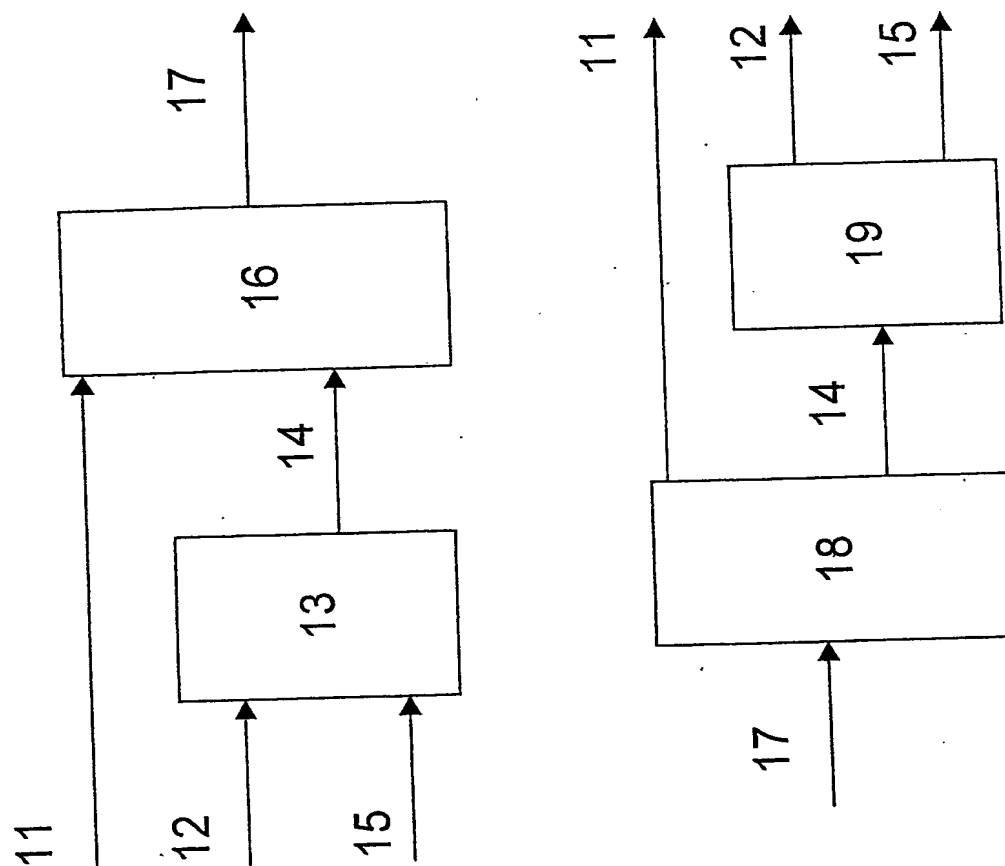


FIG. 1

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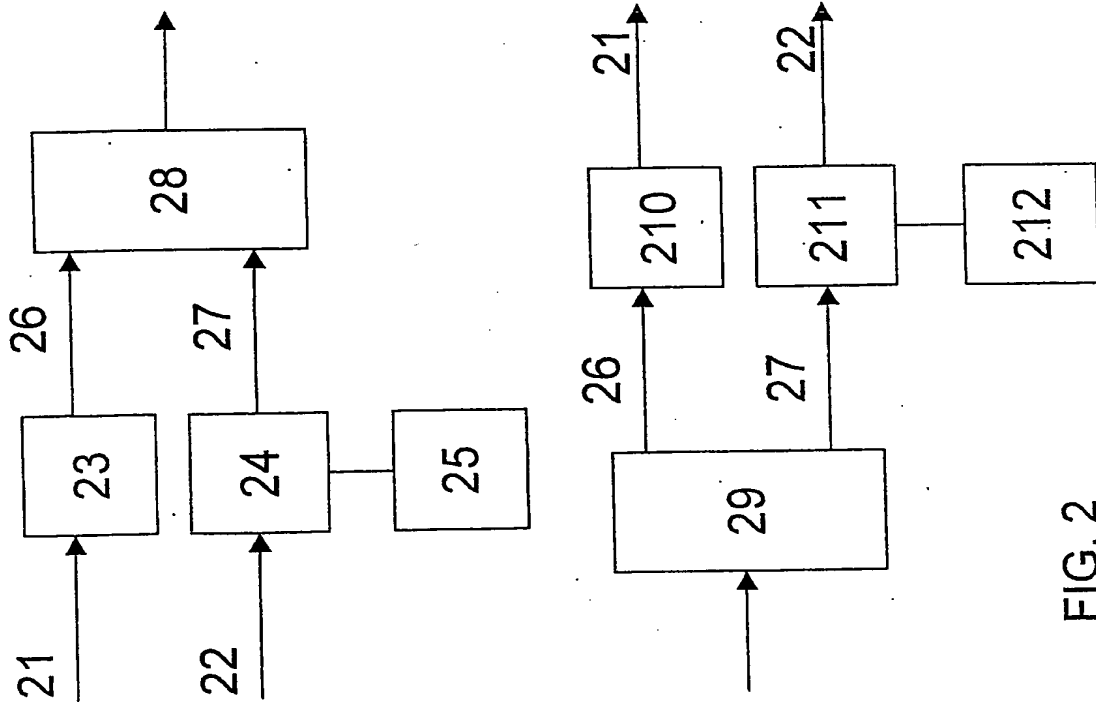


FIG. 2

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 01/04501

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04N7/088 H04N7/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
 EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 398 070 A (LEE DONG H) 14 March 1995 (1995-03-14) column 3, line 54 -column 5, line 54; figures 2,3 column 6, line 49 -column 7, line 11	1-12
X	EP 0 508 939 A (GOMES DOS SANTOS ALCINO) 14 October 1992 (1992-10-14) the whole document	1-12
A	WO 94 08677 A (JANI JEFFREY SCOTT) 28 April 1994 (1994-04-28) page 2, line 34 -page 3, line 28; figure 1	1-12

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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G document member of the same patent family

Date of the actual completion of the international search

16 July 2001

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 01/04501

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